

NO2 Data Synthesis Interoperability Network



**Earth Science Information Partners
Air Quality Cluster**

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http://wiki.esipfed.org/index.php/Air_Quality_Cluster

**Earth Observation and Natural Resources & Environment Workgroup (EONRE)
OGC TC Meeting
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ESIP History

- **1998** - ESIP Formed by NASA in Response to a NRC Recommendation for “Community Involvement” in EOSDIS.
- **2003** - Evolved Plan to Become a Broad-Based Inter-Disciplinary Collaborative Forum (Cyberinfrastructure) for the Earth Science Information Community.
- **2004** NOAA/NESDIS Becomes Second Strategic Partner.
- **2007** - EPA becomes Third Strategic Partner.
- **2003-2007** - Membership Grows from 24 to 103 Entities.

Collaboration & Interoperability

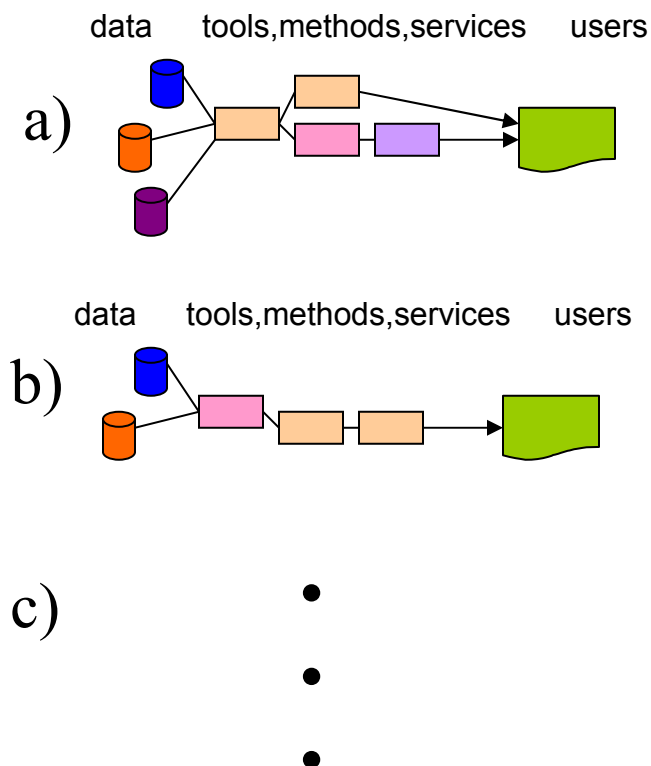
- **Provide Neutral Turf** where Major Earth Observing Agencies Can Work Together with Other Community Interests to Advance Key National Objectives
- **Provide a Broad-Based Community-of-Practice** where Strategic Partners can Seek Advice, Generate New Collaborations and Cultivate New End-Users.
- **Provide a Forum** in which Inter-Agency, Inter-Disciplinary, Interoperability Problems can be Addressed and Resolved.
- **Provide an Earth Information Exchange** where the Products and Services of all ESIP Members can be Easily Found and Acquired.

ESIP Air Quality Cluster

The objective of the ESIP Air Quality Cluster is to connect air quality data consumers with the providers of those data by:

- bringing people and ideas together on how to deliver ES data to AQ researchers, managers and other users
- facilitate and demonstrate the information **flow of from data providers to air quality consumers**

AQ Cluster brings together groups and **builds links** among them in order to achieve an effective use of data in decision-making that could not be achieved by any organization acting on its own.



AQ Cluster aids in **reuse** of data, processing tools and other services so that projects, programs and agencies avoid the burden of developing those capabilities or establishing connections to them.

The Air Quality Web Landscape (*not comprehensive*)

NASA Programs/Projects

- REASoN (Friedl, Moe)
 - WRAP (Ambrosia, Sullivan)
 - EDAC (Morain, Benedict, Hudspeth)
 - LAITS (Di, Yang)
 - AQ Web Infrastructure (Husar, Falke)
- ACCESS (Lindsay, Maiden)
 - Giovanni (GSFC – Kempler)
- DECISIONS (Friedl)
 - 3D AQS (Hoffman, Engel-Cox)
 - RS for BlueskyRAINS (Sullivan, Raffuse)
 - Aura in AQ Forecasting (McHenry)
- AIST (Moe)
 - SAMITS (Falke)
 - Sensor Web Architecture & Demo (Mandl)
- DAACS
- Geoscience Interoperability Office (Bambacus, Cole)

EPA Programs/Projects

- AMI (Young, Keating)
- GEO (Young, Washburn, Lyon, Foley)
- AirNOW (Wayland, Dickerson)
- AirQuest
- OAQPS (Scheffe, Frank, Dimmick, Solomon, Pace)
- IDEA (w/ NASA, NOAA) (Szykman)
- HTAP (Keating)
- Remote Sensing Gateway (Paulson, Walter)
- Environmental Science Connector (Kapuscinski)

NOAA Programs/Projects

- Air Quality Forecasting (Fine, NESDIS)
- NGDC (Haberman, Kozimor)
- Hazard Mapping System (Ruminski)

Forest Service Programs/Projects

- Bluesky (Larkin, Goodrick)
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Mediators

- DataFed (Husar)
- Unidata (Domenico, Ramamurthy)
- CDE (Ambrosia, Sullivan)
- Giovanni (Kempler, Leptoukh, Berrick)
- LAITS (Di)
- RSG (Paulson)
- NEISGEI (Falke)

Portals / Catalogs

- Earth Information Exchange (ESIP)
- Earth Observation Portal (GEO)
- Geospatial One Stop
- Earth Science Gateway (NASA)
- Environmental Science Connector (EPA)
- Global Change Master Directory (GCMD)
- ECHO (NASA)
- LEAD (NSF)

Interoperability Efforts

- GALEON
- NASA GIO – DAACS
- ESIP
- OGC GSN (demos)
- OGC OWS testbeds
- GEOSS pilots

State

- Aura in AQ Forecasting (Lamb, Vaughan)
- RPOs
- Vermont (Poirot)

International

- ESA/KMNI
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NO2 Data Synthesis Activity

Objective:

- Establish and demonstrate multi-data, multi-organization, multi-service interoperability using web service standards (i.e., interoperability experiment)
- NO2 is an initial focus . The effort aims to be a stepping stone towards greater interoperability of many other types of air quality tools, datasets, and models.
- Create data flow value chains applying data **provider push** and **user pull**.

Why Nitrogen Dioxide:

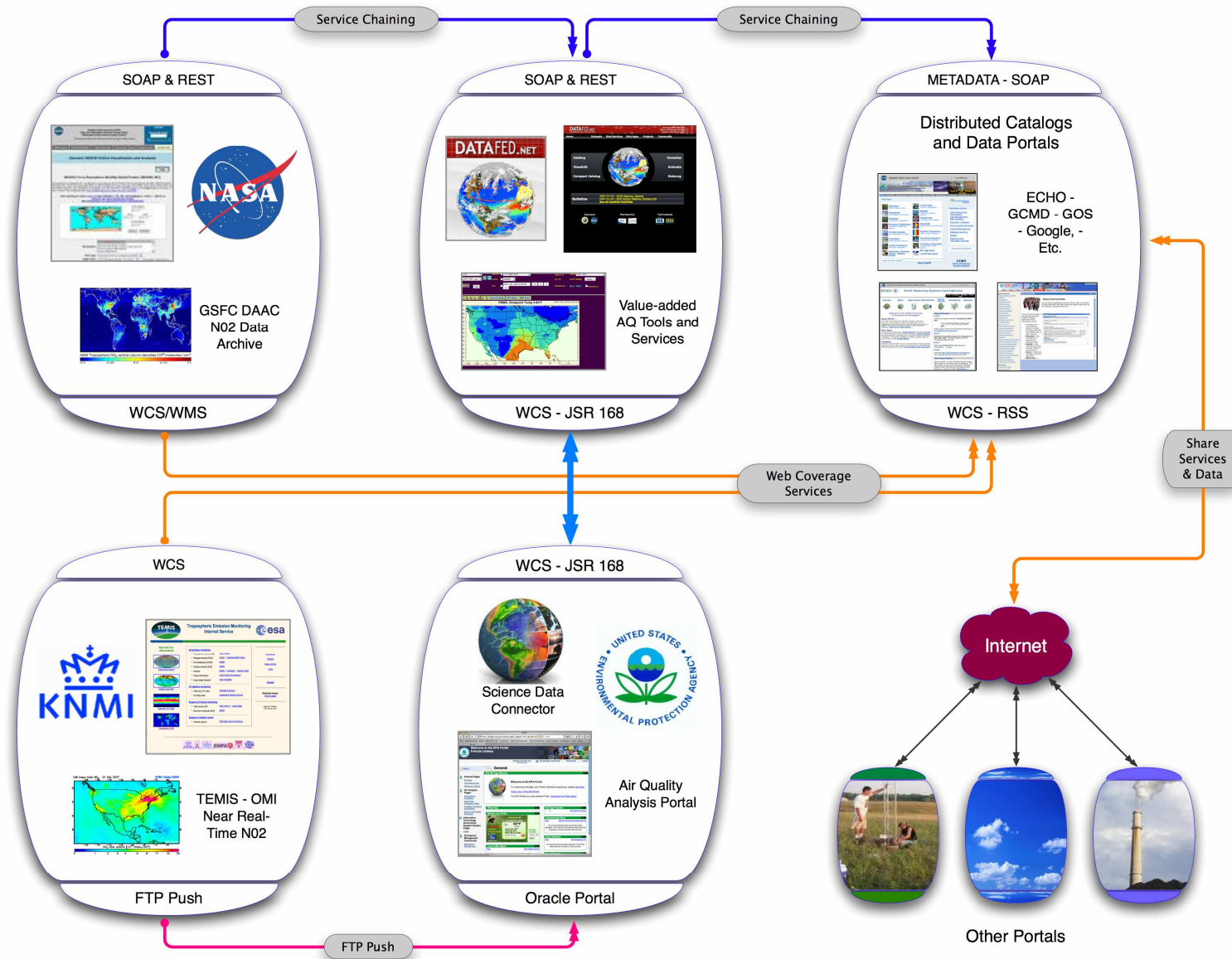
- Availability of satellite and surface data, analysis tools and models
- Interest in how satellite NO2 data can be used in AQ science and management
- NO2 is 1 of 6 US National Air Quality Standards (NAAQS) criteria pollutants
- NO2 is a precursor for tropospheric ozone; emissions are combustion processes

Key datasets:

- EPA AQS surface hourly NO2 concentration measurements
- OMI, SC, GOME satellite derived NO2 density columns
- EPA Continuous Emissions Monitoring at power plants

OMI NO2 Interoperability Network

Example Data Flow

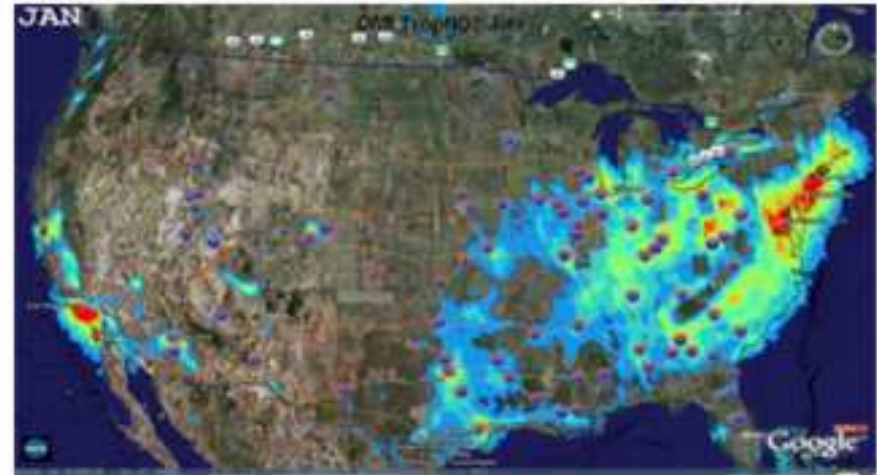


Source: Frank Lindsay, NASA 2007

Weekly & Seasonal Analysis with DataFed & GoogleEarth



Friday vs. Sunday aggregate

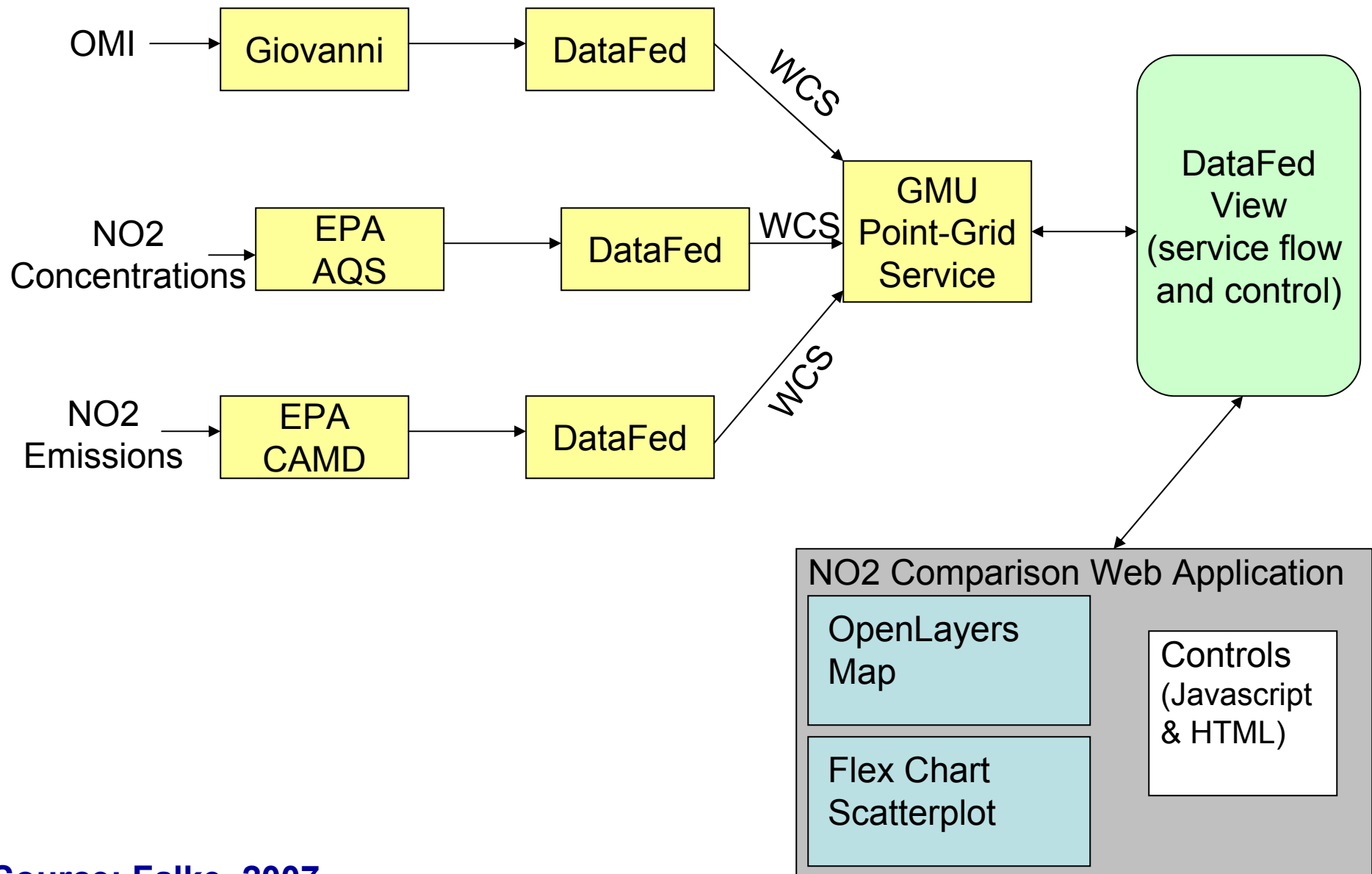


Winter vs. Summer aggregate



Source: [Husar and Robinson, 2007](#)

NO2 Surface – Satellite Measurement Web Application



Source: Falke, 2007

Other Activities

- 3DAQS project (Ray Hoff, PI) providing data to EPA Air Quality System (AQS) database
- OMI input to AirNOW-Tech
- Registration of components in Earth Information Exchange and other catalogs/portals
- Coordination with satellite data providers and air quality scientists,

More information:

[http://wiki.esipfed.org/index.php/NO2 Data Synthesis](http://wiki.esipfed.org/index.php/NO2_Data_Synthesis)